

utilization, as described below.

In one embodiment, bandwidth management device 50 includes all or a subset of known bandwidth management functionality, such as that contained in a hardware appliance sold under the trademark PACKETSHAPER® by Packeteer, Inc. of Cupertino,

5 California. For example, bandwidth management device 50 may include any or all of the functionality disclosed in the following co-owned patents, all of which are incorporated by reference herein: 1) U.S. 5,802,106, entitled "Method for Rapid Data Rate Detection in a Packet Communication Environment Without Data Rate Supervision"; 2) U.S. 6,018,516, entitled "Method for Minimizing Unneeded Retransmission of Packets in a Packet
10 Communication Environment Supporting a Plurality of Data Link Rates"; 3) U.S. 6,038,216, entitled "Method for Explicit Data Rate Control in a Packet Communication Environment Without Data Rate Supervision"; 4) U.S. 6,046,980 entitled "System for Managing Flow Bandwidth at Network, Transport and Application Layers in Store and Forward Network"; 5) U.S. 6,115,357, entitled "Method for Pacing Data Flow in a Packet-Based Network"; and 6)
15 U.S. 6,205,120, entitled "Method for Transparently Determining and Setting an Optimal Minimum Required TCP Window Size." Additionally, bandwidth management device 50 may further include functionality described in co-owned and pending applications, both of which are incorporated by reference herein: 1) U.S. Serial No. 09/198,090, filed Nov. 23, 1998, entitled "Method for Automatically Classifying Traffic in a Packet Communications
20 Network", now U.S. 64/2000; and 2) U.S. Serial No. 09/710,442, filed Nov. 10, 2000, entitled "Application Service Level Mediation and Method of Using the Same", now
U.S. _____.

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Figures 1, 4 and 5 illustrate various deployment locations for bandwidth management device 50. Bandwidth management device 50 may be deployed as customer premise
25 equipment, as Figure 1 shows, between network 34 and routing device 60 or, as Figure 4 shows, between routing device 60 and access link 40. Bandwidth management device 50 may also reside, as Figure 5 illustrates, between access link 40 and wide area network 90. Moreover, the functionality performed by bandwidth management device 50 may reside on

enterprise customers. In one embodiment, application performance and bandwidth utilization data includes utilization of bandwidth by applications running at customer sites 30 over an analysis interval, and response time data, over the analysis interval, associated with applications, including total round trip times for network traffic (i.e., from client to server to client) and allocation of round trip time along the demarcation point between customer site 30 and the facilities of the Network Services Provider, as more fully described in co-pending application serial no. 09/710,442, filed Nov. 10, 2000 and entitled "Application Service Level Mediation and Method of Using the Same", ~~now U.S. _____~~. However, bandwidth management device 50 can be used to collect an array of application performance and bandwidth utilization data, including but not limited to 1) response time, 2) variation in response time, 3) response time distribution, 4) service level violations (e.g., number of instances where response time exceeded a specified threshold), 5) availability of an application service traversing access link 40, 6) efficiency (e.g., number of dropped packets), 7) raw throughput as to number of bytes and/or transactions, and 8) average and peak traffic loads on access link 40.

Device manager server 82 receives application performance and bandwidth utilization data from bandwidth management device 50 and stores the data in network traffic database 88. In one embodiment, the unit of application performance and bandwidth utilization data includes a field identifying the specific bandwidth management device associated with the data. Other fields in the data unit can include transmission data and time, analysis time interval, and any other suitable information. In one embodiment, application performance and bandwidth utilization data can be raw data collected by bandwidth management device 50 and transmitted to device manager server 86 for analysis and reporting on a periodic basis. In another embodiment, bandwidth management device 50 includes functionality allowing for at least partial analysis and summarization of the data over the collection interval. In one embodiment, bandwidth management device 50 transmits the analyzed data and/or the raw data to device manager server 86, which stores the data in network traffic database 88. Application performance and bandwidth utilization

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